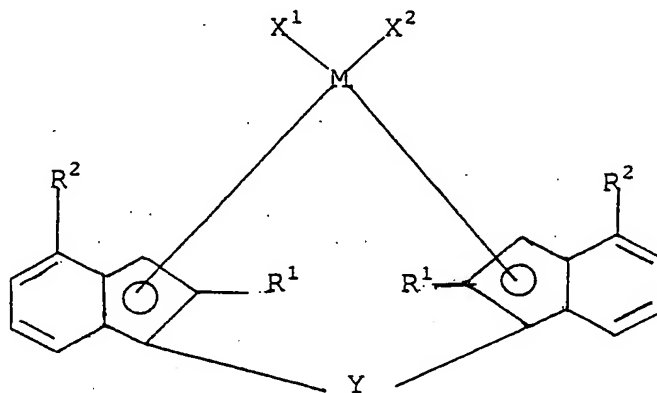


WHAT IS CLAIMED

1. A propylene polymer composition which is the product obtained by the process comprising:

polymerizing propylene or copolymerizing propylene and at least one olefin selected from the group consisting of ethylene and α -olefins of 4 to 20 carbon atoms in the presence of an olefin polymerization catalyst comprising

(i) a transition metal compound (h) represented by the following formula:



wherein

M is zirconium;

R¹ is an alkyl group of 2 to 6 carbon atoms;

R² is an aryl group selected from the group consisting of phenyl, naphthyl, anthracenyl and phenanthryl, wherein the aryl group is unsubstituted or substituted with a halogen atom or a hydrocarbon group of 1 to 20 carbon atoms;

X¹ and X² are each a hydrogen atom, a halogen atom, a hydrocarbon group of 1 to 20 carbon atoms, a halogenated hydrocarbon group of 1 to 20 carbon atoms, an oxygen-containing group or a sulfur-containing group; and

Y is a divalent silicon-containing group selected from the group consisting of dialkylsilylene, alkylarylsilylene and diarylsilylene; and

(ii) at least one compound selected from the group consisting of

an organoaluminum oxy-compound, and

a compound which reacts with the transition metal compound (h) to form an ion pair,

to prepare a propylene homo- or co-polymer (A);

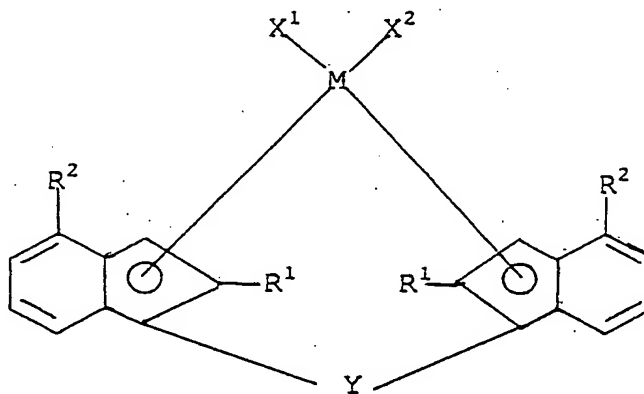
polymerizing or copolymerizing at least one monomer selected from the group consisting of olefins of 2 to 20 carbon atoms and polyenes of 5 to 20 carbon atoms in the presence of an olefin polymerization catalyst which may be the same or different from the aforementioned olefin polymerization catalyst to prepare an olefin elastomer (D) which contains constituent units derived from ethylene, propylene, butene or 4-methyl-1-pentene in an amount of less than 90% by mol, and has a glass transition temperature (T_g) of not higher than 10°C;

polymerizing one monomer selected from the group consisting of ethylene, butene and 4-methyl-1-pentene or copolymerizing said one monomer with at least one additional monomer selected from the group consisting of olefins of 2 to 20 carbon atoms other than said one monomer and polyenes of 5 to 20 carbon atoms, in the presence of an olefin polymerization catalyst which may be the same as or different from the aforementioned olefin polymerization catalyst to prepare an olefin polymer (E) which contains constituent units derived from said one monomer in an amount of not less than 90% by mol; and mixing 5 to 95% by weight of the propylene homo- or co-polymer (A), not more than 95% by weight of the olefin elastomer (D), and not more than 95% by weight of the olefin polymer (E).

2. A propylene polymer composition which is the product obtained by a multi-stage polymerization method comprising the steps of:

polymerizing propylene or copolymerizing propylene and at least one olefin selected from the group consisting of ethylene and α -olefins of 4 to 20 carbon atoms in the presence of an olefin polymerization catalyst comprising

(i) a transition metal compound (h) represented by the following formula:



wherein

M is zirconium;

R¹ is an alkyl group of 2 to 6 carbon atoms;

R² is an aryl group selected from the group consisting of phenyl, naphthyl, anthracenyl and phenanthryl, wherein the aryl group is unsubstituted or substituted with a halogen atom or a hydrocarbon group of 1 to 20 carbon atoms;

X¹ and X² are each a hydrogen atom, a halogen atom, a hydrocarbon group of 1 to 20 carbon atoms, a halogenated hydrocarbon group of 1 to 20 carbon atoms, an oxygen-containing group or a sulfur-containing group; and

Y is a divalent silicon-containing group selected from the group consisting of dialkylsilylene, alkylarylsilylene and diarylsilylene; and

(ii) at least one compound selected from the group consisting of an organoaluminum oxy-compound, and a compound which reacts with the transition metal compound (h) to form an ion pair

to prepare a propylene homo- or co-polymer (A); polymerizing or copolymerizing at least one monomer selected from the group consisting of olefins of 2 to 20 carbon atoms and polyenes of 5 to 20 carbon atoms in the presence of an olefin polymerization catalyst which may be the same as or different from the aforementioned olefin polymerization catalyst to prepare olefin elastomer (D) which contains constituent units derived from ethylene, propylene, butene or 4-methyl-1-pentene in an amount of less than 90% by mol, and has a glass transition temperature (T_g) of not higher than 10°C;

polymerizing one monomer selected from the group consisting of ethylene, butene and 4-methyl-1-pentene or copolymerizing said one monomer with at least one additional monomer selected from the group consisting of olefin of 2 to 20 carbon atoms other than said one monomer and polyenes of 5 to 20 carbon atoms in the presence of an olefin polymerization catalyst which may be the same as or different from the aforementioned olefin polymerization catalyst to prepare an olefin polymer (E) which contains constituent units derived from said one monomer in an amount of not less than 90% by mol; and

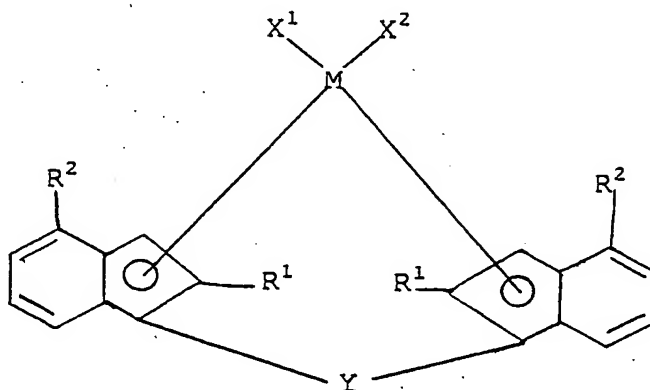
wherein the steps of preparing the propylene homo- or co-polymer (A), preparing the olefin elastomer (D) and preparing the olefin polymer (E) are conducted in an arbitrary order; and the amount of the propylene homo- or co-polymer (A) is 5 to 95% by weight, and the amount of the

olefin elastomer (D) is not more than 95% by weight, and the amount of the olefin polymer (E) is not more than 95% by weight.

3. A propylene polymer composition which is the product obtained by the process comprising:

polymerizing propylene or copolymerizing propylene and at least one olefin selected from the group consisting of ethylene and α -olefins of 4 to 20 carbon atoms in the presence of an olefin polymerization catalyst comprising

(i) a transition metal compound (h) represented by the following formula:



wherein

M is zirconium;

R¹ is an alkyl group of 2 to 6 carbon atoms;

R² is an aryl group selected from the group consisting of phenyl, naphthyl, anthracenyl and phenanthryl, wherein the aryl group is unsubstituted or substituted with a halogen atom or a hydrocarbon group of 1 to 20 carbon atoms;

X¹ and X² are each a hydrogen atom, a halogen atom, a hydrocarbon group of 1 to 20 carbon atoms, a halogenated hydrocarbon group of 1 to 20 carbon atoms, an oxygen-containing group or a sulfur-containing group; and

Y is a divalent silicon-containing group selected from the group consisting of dialkylsilylene, alkylarylsilylene and diarylsilylene; and

(ii) at least one compound selected from the group consisting of

an organoaluminum oxy-compound, and

a compound which reacts with the transition metal compound (h) to form an ion pair,

to prepare a propylene homo- or co-polymer (A);
polymerizing propylene or copolymerizing propylene and not more than 10% by mol of at least one olefin selected from the group consisting of ethylene and α -olefins of 4 to 20 carbon atoms in the presence of an olefin polymerization catalyst comprising a metallocene compound or an olefin polymerization catalyst comprising (d) a solid titanium catalyst component and (e) an organometallic compound catalyst component

to prepare a propylene homo- or co-polymer (A') which contains constituent units derived from propylene in an amount of not less than 90% by mol and is different from the propylene homo- or co-polymer (A),

wherein, the ratio of the intrinsic viscosity (η_A) of the propylene homo- or co-polymer (A) and the intrinsic viscosity ($\eta_{A'}$) of the propylene homo- or co-polymer (A'), measured in decalin at 135°C, ($\eta_A/\eta_{A'}$) or ($\eta_{A'}/\eta_A$) is in the range of 3 to 30;

polymerizing or copolymerizing at least one monomer selected from the group consisting of olefins of 2 to 20 carbon atoms and polyenes of 5 to 20 carbon atoms in the presence of an olefin polymerization catalyst which may be the same as or different from the aforementioned olefin polymerization catalyst to prepare an olefin elastomer (D)

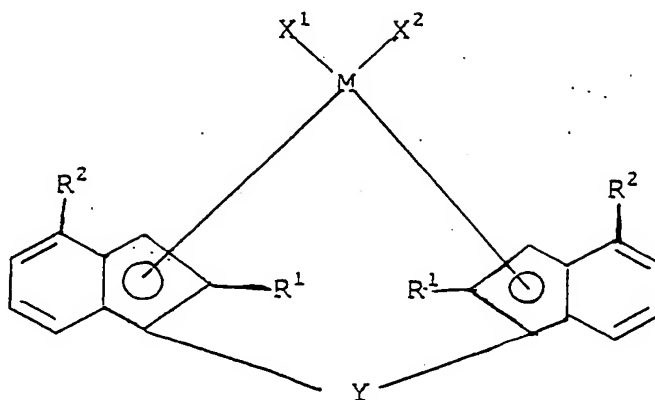
60 which contains constituent units derived from ethylene,
61 propylene, butene or 4-methyl-1-pentene in an amount of less
62 than 90% by mol, and has a glass transition temperature (Tg)
63 of not higher than 10°C;

64 polymerizing one monomer selected from the group
65 consisting of ethylene, butene and 4-methyl-1-pentene or
66 copolymerizing said one monomer with at least one additional
67 monomer selected from the group consisting of olefins of 2
68 to 20 carbon atoms other than said one monomer and polyenes
69 of 5 to 20 carbon atoms in the presence of an olefin
70 polymerization catalyst, which may be the same as or
71 different from the aforementioned olefin polymerization
72 catalyst, to prepare an olefin polymer (E) which contains
73 constituent units derived from said one monomer in an amount
74 of not less than 90% by mol; and
75 mixing 5 to 95% by weight of the propylene homo- or co-
76 polymer (A), not more than 95% by weight of the propylene
77 homo- or co-polymer (A'), not more than 95% by weight of the
78 olefin elastomer (D), and not more than 95% by weight of the
79 olefin polymer (E).

1 4. A propylene polymer composition which is the product
2 obtained by a multi-stage polymerization method comprising
3 the steps of:

4 polymerizing propylene or copolymerizing propylene and
5 at least one olefin selected from the group consisting of
6 ethylene and α -olefins of 4 to 20 carbon atoms in the
7 presence of an olefin polymerization catalyst comprising

(i) a transition metal compound (h) represented by the following formula:



wherein

M is zirconium;

R¹ is an alkyl group of 2 to 6 carbon atoms;

R² is an aryl group selected from the group consisting of phenyl, naphthyl, anthracenyl and phenanthryl, wherein the aryl group is unsubstituted or substituted with a halogen atom or a hydrocarbon group of 1 to 20 carbon atoms;

X¹ and X² are each a hydrogen atom, a halogen atom, a hydrocarbon group of 1 to 20 carbon atoms, a halogenated hydrocarbon group of 1 to 20 carbon atoms, an oxygen-containing group or a sulfur-containing group; and

Y is a divalent silicon-containing group selected from the group consisting of dialkylsilylene, alkylarylsilylene and diarylsilylene; and

(ii) at least one compound selected from the group consisting of

an organoaluminum oxy-compound, and

a compound which reacts with the transition metal compound (h) to form an ion pair,

to prepare a propylene homo- or co-polymer (A);

polymerizing propylene or copolymerizing propylene and not more than 10% by mol of at least one olefin selected

40 from the group consisting of ethylene and α -olefins of 4 to
41 20 carbon atoms in the presence of an olefin polymerization
42 catalyst comprising a metallocene compound or an olefin
43 polymerization catalyst comprising (d) a solid titanium
44 catalyst component and (e) an organometallic compound
45 catalyst component,

46 to prepare a propylene homo- or co-polymer (A') which
47 contains constituent units derived from propylene in an
48 amount of not less than 90% by mol and is different from the
49 propylene homo- or co-polymer (A), wherein, the ratio of the
50 intrinsic viscosity (η_A) of the propylene homo- or co-
51 polymer (A) and the intrinsic viscosity ($\eta_{A'}$) of the
52 propylene homo- or co-polymer (A'), measured in decalin at
53 135 °C, ($\eta_A/\eta_{A'}$) or ($\eta_{A'}/\eta_A$) is in the range of 3 to 30;

54 polymerizing or copolymerizing at least one monomer
55 selected from the group consisting of olefins of 2 to 20
56 carbon atoms and polyenes of 5 to 20 carbon atoms in the
57 presence of an olefin polymerization catalyst which may be
58 the same as or different from the aforementioned olefin
59 polymerization catalyst to prepare an olefin elastomer (D)
60 which contains constituent units derived from ethylene,
61 propylene, butene or 4-methyl-1-pentene in an amount of less
62 than 90% by mol, and has a glass transition temperature (T_g)
63 of not higher than 10°C;

64 polymerizing one monomer selected from the group
65 consisting of ethylene, butene and 4-methyl-1-pentene or
66 copolymerizing said one monomer with at least one additional
67 monomer selected from the group consisting of olefins of 2
68 to 20 carbon atoms other than said one monomer and polyenes
69 of 5 to 20 carbon atoms in the presence of an olefin
70 polymerization catalyst, which may be the same as or
71 different from the aforementioned olefin polymerization

72 catalyst, to prepare an olefin polymer (E) which contains
73 constituent units derived from said one monomer in an amount
74 of not less than 90% by mol; and
75 wherein the steps of preparing the propylene homo- or co-
76 polymers (A) and (A'), preparing the olefin elastomer (D)
77 and preparing the olefin polymer (E) are conducted in an
78 arbitrary order; and the amount of the propylene homo- or
79 co-polymer (A) is 5 to 95% by weight, the amount of the
80 propylene homo- or co- polymer (A') is not more than 95% by
81 weight, the amount of the olefin elastomer (D) is not more
82 than 95% by weight and the amount of the olefin polymer (E)
83 is not more than 95% by weight.--